

Review for Test for MCA

(problems from the Massachusetts's Dept of Ed)

Key
Name _____

1. The diameter of a red blood cell, in inches, is 3×10^{-4} . This expression is the same as which of the following numbers?

A. 0.00003 **B. 0.0003** C. 0.003 D. 3,000 E. 30,000

2. 0.4 is the same as

A. four **B. four tenths** C. four hundredths D. one-fourth

3. At 11:00 AM, a one-meter high mailbox casts a 0.2-meter shadow. If a pole beside the mailbox casts a 4-meter shadow, how tall is that pole?

A. 2 meters **B. 20 meters** C. 0.2 meters D. 0.02 meters

4. Mr. Chang wants to order notebooks for the school store. Notebooks come in four colors: red, green, blue and black. He randomly surveyed 50 students to determine which color notebook they would buy. The table below shows the results.

NOTEBOOK COLOR VOTES				
Color	Red	Blue	Green	Black
Number of Votes	16	22	5	7

Mr. Chang will order 400 notebooks. How many blue notebooks should he order?

A. 22 B. 88 **C. 176** D. 200

5. A quality-control expert for a key manufacturer examined the keys produced by a particular machine. The table below shows the number of defective keys found in the 8 groups of 100 keys he examined.

GROUPS OF 100 KEYS EXAMINED								
Group Number	1	2	3	4	5	6	7	8
Number of Defective Keys	7	2	4	5	7	8	1	0

How many defective keys would be expected in a group of 5,000 keys? Round the answer to the nearest whole number.

A. 150 B. 170 **C. 213** D. 243

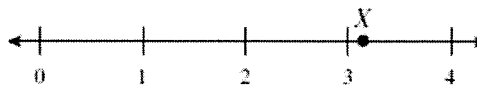
6. What is the value of the expression? $(3^2 + 3)(3^2 - 3)$

A. 27 **B. 72** C. 81 D. 90

7. What is the value of the expression? $|2^3 - 3^2|$

A. 0 **B. 1** C. 2 D. 3

8. Point X is graphed on the number line as shown at right.



Which of the following numbers is closest to the location of point X?

A. $\sqrt{6}$ B. $\sqrt{8}$ **C. $\sqrt{11}$** D. $\sqrt{13}$

9. A fast-growing strain of bacteria doubles in population every 20 minutes. A laboratory has a culture of 200 of these bacteria cells. The function below can be used to find p, the number of bacteria cells in this culture after t hours.

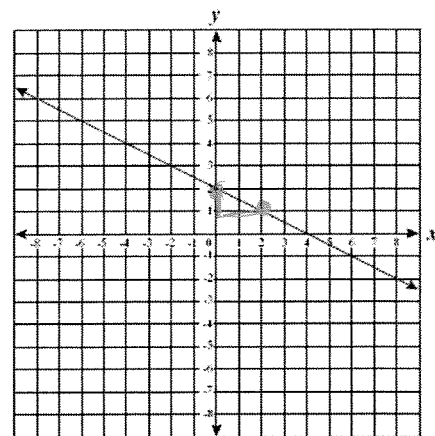
$$p = 200(8^t)$$

Which of the following is closest to the total number of bacteria cells after 2 hours?

A. 3,200 **B. 12,800** C. 51,200 D. 2,560,000

10. Which of the following best represents the equation of the line shown on the graph at right?

- A. $y = -\frac{1}{2}x + 2$ B. $y = -2x + 2$
~~C. $y = -\frac{1}{2}x + 4$~~ ~~D. $y = -2x + 4$~~



11. If x and y are defined as indicated by the accompanying table, which equation correctly represents the relationship between x and y ?

- A. $y = x + 2$ B. $y = 2x + 2$ C. $y = 2x + 3$ D. $y = 2x - 3$

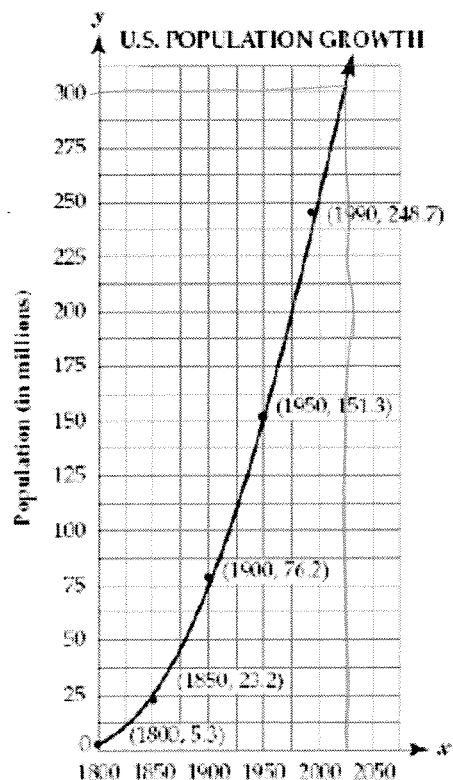
Handwritten notes: $\begin{matrix} 0 & -3 \\ 1 & -1 \end{matrix}$ and $+1 \left(\begin{matrix} 2 & 1 \\ 3 & 3 \\ 5 & 7 \\ 7 & 11 \end{matrix} \right) + 2$ and $\frac{\Delta y}{\Delta x} = \frac{2}{1}$

x	y
2	1
3	3
5	7
7	11

12. The graph at right shows the population growth for the United States since 1800. A curve of best fit has been drawn.

According to the curve of best fit, in what year will the population be 300 million?

- A. 2000 B. 2024 C. 2031 D. 2050

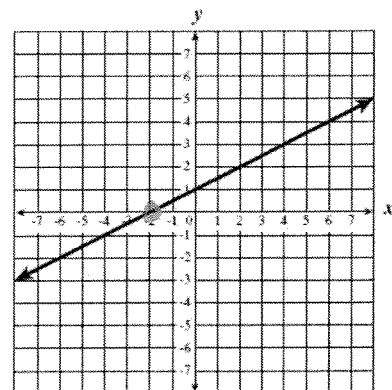


13. What is the y-intercept of the line defined by $y = 6x - 4$?

- A. -4 B. $-\frac{2}{3}$ C. $\frac{2}{3}$ D. 4

14. What is the apparent x-intercept of the line graphed at right?

- A. 2 B. 1 C. -1 D. -2

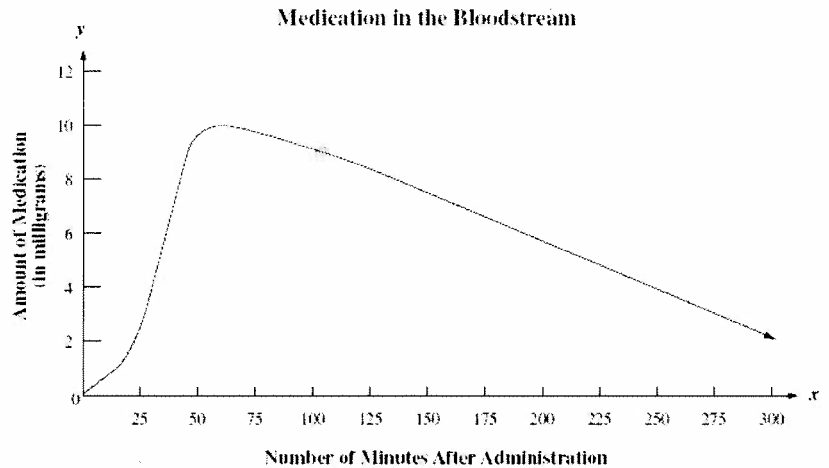


15. Ralph simplified the equation $15(1/3 + 2/5)$ to $(5+6)$. Which of the following properties did Ralph use?

A. associative property of multiplication
 B. commutative property of multiplication
 C. distributive property
 D. multiplicative identity property

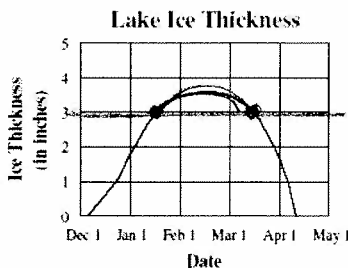
16. The graph at right shows the number of milligrams of a medication in the bloodstream from the time it was administered to 300 minutes after administration.

Using the information from the graph, which of the following statements is true?



- ~~A.~~ The maximum amount of medication in the bloodstream was 12 milligrams.
~~B.~~ The minimum amount of medication was in the bloodstream 300 minutes after administration.
 C. The amount of medication in the bloodstream increased at a faster rate than it decreased.
~~D.~~ The maximum amount of medication was in the bloodstream 100 minutes after administration.

17. The graph below shows the thickness of the ice on a lake during the colder months.



Which of the following is closest to the number of days the ice was at least 3 inches thick?

- A. 30 B. 45 C. 60 D. 75

$15 + 28 + 15 = 58$
 Jan Feb Mar

18. Shelly is registering at a hotel that has 14 rooms available on the first floor, 10 rooms available on the second floor, and 16 rooms available on the third floor. If Shelly is assigned one of these hotel rooms at random, what is the probability that it will be on the second floor?

- A. $1/4$ B. $3/10$ C. $1/3$ D. $2/5$

$$14 + 10 + 16 = 40$$

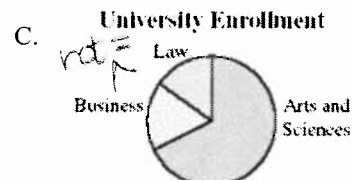
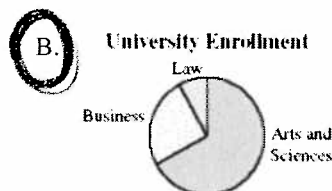
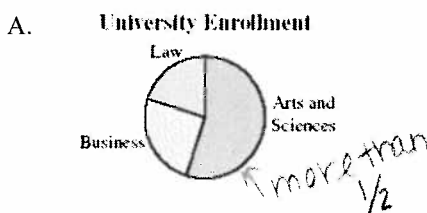
$$\frac{10}{40} = \frac{1}{4}$$

19. A local university is divided into three colleges. The table at right shows the number of students enrolled in each college.

University Enrollment

College	Number of Students
Arts and Sciences	8036
Business	2977
Law	1014

Which of the following circle graphs best represents the data in the table?



20. The stem-and-leaf plot at right shows the scores on a history exam.

Exam Scores

5	8
6	6 7
7	0 3 3 6
8	4 5 5
9	2 2 4 7
10	1

Which of the following measures of the data is greatest?

- A. mean B. median C. mode D. range

81.25

84.5

92

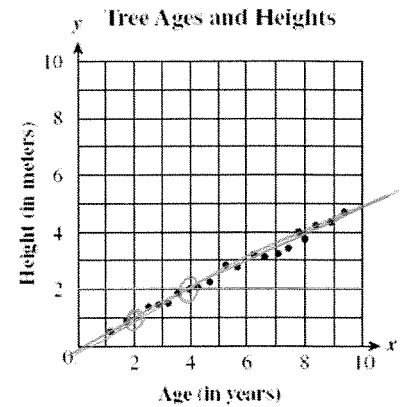
42

Key
6 2 represents 62

21. The scatterplot below shows the ages and heights of 20 trees on a tree farm.

If x = age in years and y = height in meters, which of the following equations best approximates the line of best fit for this scatterplot?

- A. $y = \frac{1}{2}x$ B. $y = \frac{1}{2}x + 5$ C. $y = 2x$ D. $y = 2x + 5$



22. Marcella's homeroom had a party at a local arcade. Each of the 26 students attending played the same game. Marcella recorded the number of points that each student scored for that game and put the data into score intervals. The results are shown in the chart at right.

Arcade Game Scores

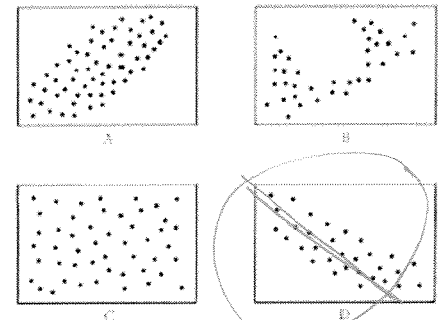
Score Interval (in points)	Number of Students
0 through 100	4
101 through 200	6
201 through 300	4
301 through 400	7
401 through 500	3
501 through 600	2

Based on the information in the chart, which interval contains the median score?

- A. 101 through 200 B. 201 through 300 C. 301 through 400 D. 401 through 500

23. Which of the scatter plots shown at right suggests a strong negative correlation?

- A. A B. B C. C D. D



24. The chart below shows the heights of 13 players on a women's basketball team.

If a player whose height is 6 feet 6 inches joined the team, which of the following statistical measures of players' heights would not change?

- A. mean B. median C. mode D. range

Basketball Team

Player	Height
1	5 ft. 4 in.
2	5 ft. 6 in.
3	5 ft. 7 in.
4	5 ft. 7 in.
5	5 ft. 7 in.
6	5 ft. 9 in.
7	5 ft. 9 in.
8	5 ft. 10 in.
9	5 ft. 11 in.
10	5 ft. 11 in.
11	6 ft.
12	6 ft. 1 in.
13	6 ft. 2 in.

25. The words 'mathematics' and 'algebra' are written on cards with one letter on each card. If one card is drawn at random, what is the probability that the card will have an 'a' on it?

- A. $\frac{2}{9}$ B. $\frac{2}{11}$ C. $\frac{1}{12}$ D. $\frac{4}{19}$

26. In a high school there are 210 sophomores, 200 juniors, and 190 seniors. A survey was taken to determine the various activities in which the students were interested. A chart was prepared to show the results of the survey. A student from the high school was chosen at random. What is the probability that the student would prefer basketball over the other five sports listed?

Preferences			
Sport	So	Jr	Sr
Football	12	15	10
Basketball	8	10	12
Baseball	8	4	6
Swimming	4	3	4
Track	6	5	4
Hockey	4	3	2
Totals	42	40	38

30

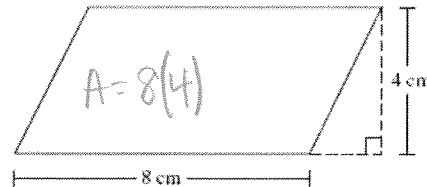
= 120

30 basketball
120 total

- A. 0.300 B. 0.250 C. 0.083 D. 0.050

27. What is the area of the parallelogram represented at right?

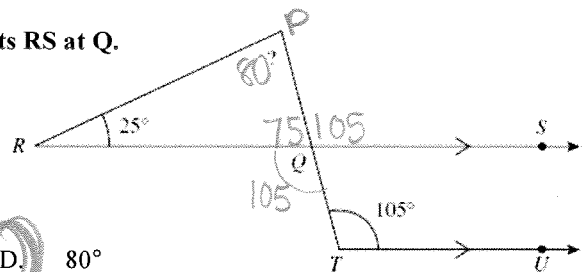
- A. 32 cm^2 B. 24 cm^2
C. 16 cm^2 D. 12 cm^2



28. In the figure shown at right, RS is parallel to TU, and PT intersects RS at Q.

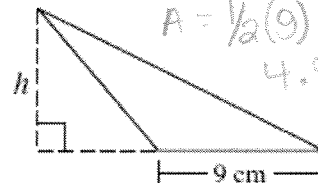
What is the measure of $\angle RPQ$?

- A. 105° B. 75° C. 90° D. 80°



29. What is h , the height of the triangle represented at right, if its area is 58.5 square centimeters?

- A. 13 cm B. 18 cm C. 26 cm D. 39 cm



$$A = \frac{1}{2}(9)h = 58.5$$

$$4.5h = 58.5$$

$$h =$$

30. The wheels on Bill's bicycle each have a radius of 35 centimeters. Which of the following is closest to the distance the bicycle moves along the ground in one complete revolution of the wheels?

- A. 35 cm B. 55 cm C. 110 cm D. 220 cm

$$C = 2\pi r$$

$$= 2(35)\pi$$

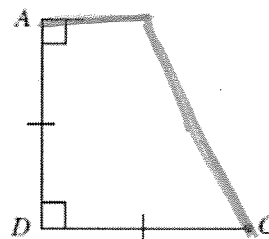
31. The sun is approximately 93,000,000 miles from earth. Light travels approximately 186,000 miles per second. (time = distance/speed)

Which of the following is closest to the number of seconds it takes light to travel from the sun to earth?

- A. 0.005 seconds B. 0.05 seconds C. 500 seconds D. 5000 seconds

$$\frac{93000000}{186000}$$

32. A partial drawing of a quadrilateral is shown below.

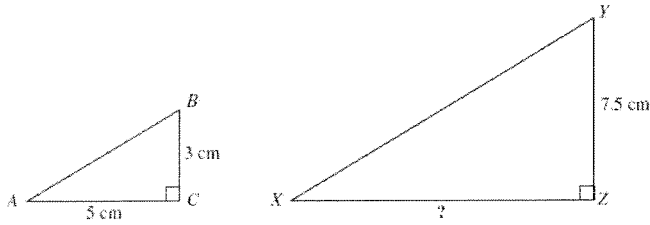


If no other sides or angles are congruent, which best describes the figure?

- A. square B. rectangle C. parallelogram D. trapezoid



33. In the figures shown below, ABC is similar to XYZ.



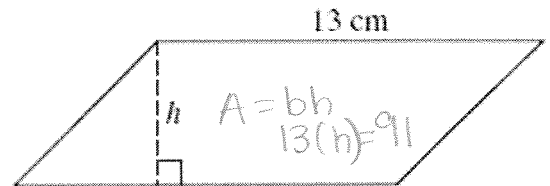
What is the length of XZ?

- A. 2.0 cm B. 4.5 cm C. 12.5 cm D. 22.5 cm

$$\frac{5}{3} = \frac{x}{7.5}$$

$$7.5\left(\frac{5}{3}\right) = x$$

34. What is h , the height of the parallelogram represented at right, if its area is 91 square centimeters?



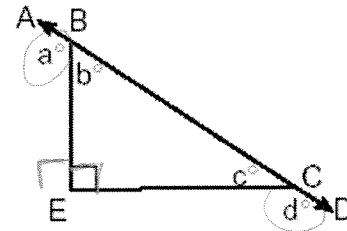
- A. 7 cm B. 9 cm C. 11 cm D. 15 cm

35. In the accompanying diagram, ABCD is a straight line, and angle E in triangle BEC is a right angle.

all exterior angles
 $360 - 90 =$

What does $a^\circ + d^\circ$ equal?

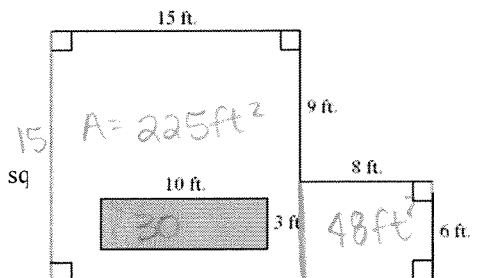
- A. 135° B. 160° C. 180° D. 270°



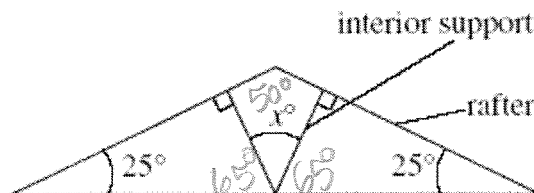
36. How many square feet of carpeting are needed to cover the floor of the room represented by the drawing at right? Note that the shaded region is to be left uncovered to leave space for the construction of a built-in trophy case with a rectangular base.

- A. 125 sq. ft. B. 243 sq. ft. C. 273 sq. ft. D. 303 sq

$$225 + 48 - 30 =$$



37. Each of the two interior supports for part of a roof is perpendicular to a rafter, as shown below.



$$65 + 65 = 130^\circ$$

$$180 - 130 = 50^\circ$$

What is x , the measure in degrees, of the angle formed by the two interior supports?

- A. 50 B. 65 C. 90 D. 130